

WHAT IS CLAIMED IS:

1. An information element to uniquely identify a service provided on a call, comprising:

an element identifier field, to identify the information element as a signaling interface between a base station controller (BSC) and a mobile switching center (MSC);  
a length field, to identify a length of the information element; and  
a service identifier field, to uniquely identify a service provided on the call.

2. The information element of claim 1, wherein the service identifier field uniquely identifies the service among a plurality of services provided on the call.

3. The information element of claim 1, wherein the service identifier field is a service option connection identifier (SOCID) field.

4. The information element of claim 1, wherein the element identifier field is an A1 element identifier field.

5. The information element of claim 1, wherein the call is established using a signaling connection control part (SCCP), and wherein a connection identifier source

location reference number/destination local reference number (SLR/DLR) is used to uniquely identify the call from among a plurality of calls.

6. A method for providing concurrent service in a communication system, comprising:

allocating a service identifier in a base station controller (BSC) for each of a plurality of services to concurrently provide the plurality of services on one logical signaling connection; and

independently controlling each of the plurality of services on the logical signaling connection between the BSC and a mobile switching center (MSC) by using the corresponding service identifier of each of the services.

7. The method of claim 6, wherein the plurality of services are further controlled according to whether the service is a packet based service or a circuit based service.

8. The method of claim 6, wherein the logical signaling connection comprises a signaling connection control part (SCCP) connection between the BSC and the MSC, and wherein the logical signaling connection further comprises a source local reference number/destination local reference number (SLR/DLR).

9. The method of claim 6, wherein a call control message and a supplementary service message that includes the service identifier are transmitted from the BSC to the MSC when a subscriber unit requires an additional service after the logical signaling connection is established.

10. The method of claim 9, wherein the additional call control message is transmitted from the BSC to the MSC when a request for supplementary service is received by the BSC from at least one of the subscriber unit and the MSC.

11. The method of claim 6, wherein the service identifier comprises an A1 element identifier field, a length field, and a service option connection identifier field.

12. The method of claim 6, wherein the BSC releases the service identifier allocated to a prescribed one of the plurality of services when a release of the corresponding service is requested while the BSC is providing the plurality of services, wherein the released service identifier is available to be reallocated for another service upon its release.

13. The method of claim 6, wherein if a request for release of a selected service during the concurrent service is received, the selected service connection setup is released using the service identifier of the selected service.

14. A method for providing concurrent services to a subscriber unit in mobile communication system, comprising:

setting up a call connection for the subscriber unit, the subscriber unit being uniquely identified from other subscriber units by a call connection identifier; and

allocating a service identifier for each service of the subscriber unit to simultaneously provide multiple communication services to the subscriber unit.

15. The method of claim 14, wherein the call connection identifier is a signaling connection control part (SCCP) connection identifier.

16. The method of claim 15, wherein the call connection identifier further includes a source local reference number/destination local reference number (SLR/DLR) identifier.

17. The method of claim 16, wherein a at least one of the base station controller (BSC) and the mobile switching center (MSC) allocates the SCCP connection identifiers SLR/DLR for a first communication service to a prescribed subscriber unit when the first communication service is the first requested to the BSC.

18. The method of claim 14, wherein one SCCP connection identifier is associated with a connected call of a subscriber unit, and wherein a unique service identifier is associated with each service provided on the connected call.

19. The method of claim 14, wherein the service identifier is a service option connection identifier (SOCl).

20. The method of claim 14, wherein each call connection can support at least two concurrent independent services over a single logical connection to a mobile switching center (MSC).

21. The method of claim 14, wherein the service identifier allocation comprises transmitting a setup message from a base station controller (BSC) to a mobile switching center (MSC) when one of a subscriber unit and the MSC notifies the BSC of a requirement for an additional communication service.

22. The method of claim 14, wherein the service identifier comprises an information element, having an A1 element identifier field, a length field, and a service option connection identifier (SOCl) field.

23. The method of claim 14, wherein a unique service identifier is used to identify each service provided on the call connection, and wherein the call connection is established on a single logical signaling connection, wherein additional services can be connected or disconnected to the subscriber unit using the one logical signaling channel without interrupting an existing service.

24. The method of claim 14, wherein the call connection is set up between a subscriber unit and a mobile switching center (MSC) through a base station controller (BSC).

25. A method for providing concurrent service in a mobile communication system, comprising:

allocating a service identifier on a logical signaling connection to uniquely identify an additional concurrent service if the additional service is requested while a first service is established;

sending an Additional Service Request message from a base station controller (BSC) to a mobile switching center (MSC) to establish an additional service connection setup with the BSC using information about the additional service and the service identifier for the additional service in response to a request for additional service;

sending an Assignment Request message from the MSC to the BSC to request a resource allocation in response to the Additional Service Request message;

sending a Call Assignment message from the BSC to a subscriber unit with allocated resource information of the BSC in response to the Assignment Request message;

sending one of a Service Connect message, a General Handoff Direction message, and a Universal Handoff Direction message from the BSC to the subscriber unit to initialize a service setup procedure in the subscriber unit for the additional service using the allocated resources;

performing a service negotiation procedure between the BSC and the subscriber unit to initialize the additional service in response to the initiation of the service setup procedure for the additional service;

sending a Service Connect Completion message from the subscriber unit to the BSC to notify the BSC that the concurrent service connection setup is completed; and

sending an Assignment Complete message from the BSC to the MSC to indicate that the concurrent service connection setup and the resource allocation are completed.

26. The method of claim 25, further comprising:

a first step of sending an Enhanced Origination message from the subscriber unit to the BSC to request the additional service;

sending a Base Station Acknowledgment Order from the BSC to the subscriber unit to acknowledge receipt of the Enhanced Origination message prior to sending the Additional Service Request message; and

sending a Ringback Tone from the MSC to the subscriber unit after the Assignment Complete message is received by the MSC.

27. The method of claim 25, wherein if the additional service is a packet data service, the method further comprises:

a first step of sending an Enhanced Origination message from the subscriber unit to the BSC to request the additional service;

sending a Base Station Acknowledgment Order from the BSC to the subscriber unit to acknowledge receipt of the Enhanced Origination message prior to sending the Additional Service Request message;



sending an A9 Setup A8 message from the BSC to a Packet Control Function (PCF) to establish an A8 user traffic connection between the BSC and the PCF over the A9 signaling connection after sending the Service Connection Completion message;

establishing an A10/A11 connection between the PCF and a Packet Data Service Node (PDSN);

sending an A9 Connect A8 message from the PCF to the BSC to complete the setup of the A8 user traffic connection;

sending the Assignment Complete message from the BSC to the MSC to indicate that the radio link and an A10 connection have been established and packet data service is ready.

28. The method of claim 25, further comprising:

sending an Additional Service Notification message from the MSC to the BSC to initiate the additional service option connection to cause the BSC to send the Additional Service Request message;

sending an Extended Alert with Information message from the BSC to the subscriber unit after the Assignment Complete message is sent, to cause the subscriber unit to generate an alert indicating an incoming call;

sending an Acknowledge message from the subscriber unit to the BSC to acknowledge receipt of the Extended Alert with Information message;

sending a Connect message from the subscriber unit to the BSC when the incoming call is answered;

sending an Acknowledge message from the BSC to the subscriber unit to acknowledge receipt of the Connect message; and

sending a connect message from the BSC to the mobile switch to indicate that the call has been answered at the subscriber unit.

29. The method of claim 25, wherein if a selected service release is requested during the concurrent service, the selected service connection setup is released using the service indicator of the selected service.

30. The method of claim 29, further comprising:

transmitting a Service Release message including the service indicator for the selected service to the BSC when the release of the selected service is requested from the MSC

initializing a selected service release procedure from the BSC to the mobile station in response to the selected service release request from the MSC;

notifying the BSC from the mobile station that the service connection release is completed as a result of the initialization; and

releasing the SOCI and the resources for the specific service from the BSC, and notifying the MSC of the release, in response to the notification that the service connection release is complete

31. The method of claim 29, wherein the selected service release request is performed by transmitting one of a Service Request message, a Resource Release Request message, and a Resource Release Request Mini message to the BSC, and wherein the method further comprises

initializing a selected service release procedure from the BSC to the MSC using the SOCI of the selected service in response to the selected service release request from the mobile station;

releasing the SOCI and the allocated resources for the selected service and from the MSC and notifying the BSC of the release in response to the initialization;

releasing the SOCI and the allocated resources for the selected service from the BSC and initializing a selected service connection release procedure to the mobile station in response to the notification; and

notifying the BSC of a result of the initialization of the selected service connection release procedure by the mobile station.

32. A method of releasing a concurrent service among a plurality of services provided on a single logical signaling connection, comprising:

sending a Service Release Request message from one of a base station controller (BSC) to a mobile switching center (MSC) and the MSC to the BSC to release the concurrent service;

sending one of a Service Connect message, a General Handoff Direction message, and a Universal Handoff Direction message from the BSC to a subscriber unit;

performing a service negotiation for the remaining service between the BSC and the subscriber unit; and

sending a Service Connect Completion message from the subscriber unit to the BSC.

33. The method of claim 32, wherein when the Service Release Request message is sent from the MSC to the BSC, the method further comprises sending a Service Release Complete message from the BSC to the MSC in response to receiving the Service Connect Completion message from the subscriber unit.

34. The method of claim 32, wherein when the Service Release Request message is sent from the BSC to the MSC, the method further comprises:

a first step of sending one of a Service Request message, a Resource Release Request message, and a Resource Release Request Mini message from the subscriber unit to a BSC to release the concurrent service;

sending the Service Release Request message from the BSC to the MSC in response to the first step; and

sending a Service Release Complete message to the BSC from the MSC in response to the Service Release message.

35. A mobile communication system, comprising:

means for establishing a radio interface connection having at least two concurrent communication services between a subscriber unit and a base station controller (BSC), each service having a service reference identifier to uniquely identify the service;

means for establishing a call connection having the at least two concurrent communication services on a single logical connection between the BSC and a mobile switching center (MSC), the call connection having a call connection identifier to uniquely identify the call connection among a plurality of call connections from a plurality of subscriber units, and each of the concurrent communication services having a service identifier to uniquely identify the corresponding service.

36. The system of claim 35, wherein the call connection identifier comprises a signaling connection control part (SCCP) identifier and a source local reference number/destination local reference number (SLR/DLR) to identify the call, and wherein the service identifier comprises a service option connection identifier (SOCI).

37. The system of claim 35, wherein each service on the radio interface connection is identified by at least one of a service reference identifier and a connection reference number.

38. A subscriber unit, comprising:  
means for establishing a call connection to a wireless communication network, the call connection having a unique identifier; and  
means for maintaining a plurality of concurrent communication services on the same call connection to the communication network, each service having a corresponding service identifier to uniquely identify the service.

39. The subscriber unit of claim 38, wherein the means for establishing a call connection to the wireless communication network causes a call connection to be set up between a base station controller (BSC) and a mobile switching center (MSC) on a single logical connection.

40. The subscriber unit of claim 38, wherein the call connection identifier comprises a signaling connection control part (SCCP) identifier and a source local reference number/destination local reference number (SLR/DLR), and wherein the service identifier comprises a service option connection identifier (SOCl).

41. A method for providing concurrent services in a mobile communication system in which each of a plurality of subscribers communicates with another subscriber or another service provider using a mobile switching center (MSC), comprising:

maintaining a plurality of concurrent services for a subscriber unit over a single logical signaling connection, at least one of the services being an active circuit based service and at least one of the services being a dormant packet data service;

re-activating the dormant packet service using an identifier for the subscriber unit and an identifier for the dormant packet service if data is transmitted to the subscriber unit over the dormant packet data service; and

transmitting the data to the subscriber unit using the re-activated packet data service.

42. The method of claim 41, wherein re-activating the dormant packet service comprises:

sending an A9-BSC service request message from a Packet Control Function (PCF) to a base station controller (BSC) to reactivate the packet data service;

sending an Additional Service Request message from the BSC to the MSC to set up the packet data service as a service among the plurality of services;

sending an assignment request message from the MSC to the BSC to request assignment of radio resources and an A8 user traffic connection between the BSC and the PCF for the packet data service;

sending an A9-BS Service Response message from the BSC to the PCF to indicate that the reservation of the packet data is proceeding;

sending a Call Allocation message from the BSC to the subscriber unit to initiate call processing for the packet data service in the subscriber unit;

sending one of a Service Connect message, an Universal Handoff Direction message, and a General Handoff Direction message from the BSC to the subscriber unit to invoke the additional service option connection;

performing a service negotiation procedure between the BSC and the subscriber unit;

sending a Service Connect Completion from the subscriber unit to the BSC to indicate that the service option connection is completed for the additional packet data service;



sending an A9 Setup A8 message from the BSC to the PCF to establish an A8 user traffic connection between the BSC and the PCF over the A9 signaling connection;

sending an A9 Connect A8 message from the PCF to the BSC to complete the setup of the A8 user traffic connection;

sending an Assignment Complete message from the BSC to the MSC to indicate that the radio link and an A10 connection have been established and packet data service is ready.

43. The method of claim 42, wherein after sending the A9-BSC service request message from the PCF to the BSC, the BSC allocates a service identifier for the packet data service.

44. A mobile communication system, comprising:  
a base station controller (BSC), configured to receive at least two concurrent communication services from a subscriber unit; and  
a mobile switching center (MSC) configured to establish a single logical connection with the BSC to carry the at least two concurrent communication services,

wherein each of the at least two concurrent communication services is uniquely identified on the single logical connection by a service identifier.